Forensic Skiagraphy

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• **Since roentgenograms are merely skiagraphs and not photographs, and since they are accordingly subject to erroneous interpretations or deductions, it would seem highly desirable that courts rely upon expert analysis of them, rather than demonstration of the negatives themselves. Such practice is customary in connection with clinical laboratory work, pathology, bacteriology and many other medical fields.**

Interpretations of skiagraphs should be clear, complete and consistent.

THE LATE Judge George H. Buck of San Mateo County would not allow the introduction of roentgenograms into his court. He believed that they were not intelligible to the average juror, and that jurors could better be informed by hearing or reading the expert interpretation of the films made by persons qualified to do so. The good judge was far ahead of his time.

The ostensible purpose of presenting roentgenograms in court is to inform members of the jury, so that they may be able to draw conclusions from objective data. The actual purpose would often appear to be to impress them and sway their emotions. To the average laymen an x-ray is a "photo" and is commonly referred to as a picture or photograph. To him, it speaks for itself. The element of correct interpretation is seldom thought of.

An x-ray film is neither a photograph nor a picture; it is a shadow-graph, or skiagraph. A photograph or picture is a representation or reflection of what the eye actually sees, and may therefore be interpreted with reasonable ability by many persons. A radiograph is a representation of shadows resulting from light's penetrating of tissues of variable density; and familiarity with skiagraphy is required for proper interpretation of it. The physical facts were set out many years ago in the Encyclopaedia Britannica: "It is well to remember that radiography is the production of a shadow picture. The shadows exist . . . because x-rays are absorbed to different degrees by different media. If we were to radiograph a perfectly homogeneous piece of muscle or steel, we should obtain a photographic plate quite uniformly blackened because the x-ray absorption would be quite uniform. The absorption of x-rays by any material depends, firstly, upon the material itself, in general the higher its atomic weight the more absorbent it is—and, secondly, upon the penetrating power or wave-length of the x-rays."[3]

In 1901 an American pioneer, Dr. Francis Williams of Boston, stated: "Radiographs should be read . . . [by one] . . . who is trained in reading them. In cases of poisoning we do not expect the jury to interpret all the tests which the chemist has made, but the latter can make the meaning of those tests clear to the jury."[6]

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The late distinguished Professor F. J. Baetjer of Johns Hopkins likewise emphasized: "There is no such thing as an x-ray picture. A roentgenogram is a projection upon a photographic plate of a series of shadows of varying density representing the various structures through which the rays have passed. The correctness of the diagnosis depends entirely upon the skill with which these various shadows are separated and interpreted. To interpret these shadows correctly one must know not only the appearance of the normal structure, but also the alterations that take place when there is a pathological process present. . . . Roentgenology is . . . a medical procedure based upon careful analysis and logical deductions from the shadows observed upon an x-ray plate, and translated into pathological terms. This means—and it cannot be too strongly emphasized—that the skill of a roentgenologist will vary directly with his medical knowledge; the value of the roentgenologist to the medical profession (and patient) will be based upon this fact and not upon his technical ability."[1]

COURT HEARINGS

Should x-ray films be shown in court? The average layman does not pretend to interpret a complex legal document; he consults or employs a lawyer to do this for him. The average lawyer does not try to interpret a complex problem in a special branch of law, such as admiralty or tax law; he consults an expert in that field. Similarly, many physicians do not try to interpret roentgenograms; they consult radiologists and seek their interpretation, combining the subsequent report with data obtained by clinical and other forms of examination. If many physicians do not attempt to interpret roentgenograms, how much less so should laymen?[2]

In my limited experience I have seen juries swayed

by gross misinterpretations of roentgenograms, the finding being dramatically "documented" by persons pointing to places on the films placed in an illuminator in the courtroom. The following are some examples:

1. A "fracture" simulated by an overlying muscle-margin shadow (notably in the case of a lumbar transverse process crossed by the edge of the psoas shadow).

2. "Silicosis" simulated by imperfect technique (chest roentgenograms made with large focal spots, or in partial expiration, or with patient motion).

3. "Pulmonary tuberculosis" simulated by local congestion, pleural thickening and other conditions.

4. Cervical spine "subluxations" and "compression fractures of lateral masses," due to slight angulation or rotation of the spine at the time of x-ray examination. (Lesions of this latter group are now frequently reported in persons alleged to have whip-lash injuries: Roentgenograms are marked with arrows, circles and lines, then displayed to an impressionable jury, often by an orthopedist-radiologist team, who readily convince the jury that dire injuries are present).

These errors could be minimized or obviated were expert reports introduced instead of roentgenograms. The experts themselves could be court appointed, if necessary. However, whether an expert's report alone, or his report and roentgenograms are introduced, the radiologist must identify himself, his specialty and his qualifications to the jury and judge. This unfortunately involves an immodest but quite essential listing of training, experience and qualifications. It involves identifying radiology as a branch of medicine. Finally, if called upon to interpret the films for or in front of the jury or judge, it involves calm appraisal of the findings and clear statement of opinion in as simple language as possible. Even after a brilliant presentation, a jury may be still a little puzzled as to the difference between a photographer and a roentgenologist, or between a radio repairman and a radiologist. Jurors need to be reminded as tactfully as possible that a radiologist *is* a physician, a doctor of medicine with three or more years of special training in the field, with limitation of practice to that field, and with better qualifications to interpret roentgenograms expertly than any other type of specialist or nonspecialist.

In many problems pertaining to the bones and the lungs, stereoscopic roentgenograms are essential for diagnosis; and since they cannot be viewed stereoscopically by twelve jurors at one time, essential points must be described rather than truly demonstrated.

It is highly desirable that radiologists and orthopedists agree on reasonably standard terminology for normal appearances, common anomalies, and common types of injury and disease. Terms such as "old" and "recent," "small" and "large," should carry qualifying phrases to indicate the precise meaning of the writer or speaker. Vertebral bodies and ribs should be numbered correctly. Osler emphasized that the practice of medicine is the practice of an art which consists largely in the balancing of probabilities. It is a science of uncertainty and an art of probability. Court hearings require a semblance of dogmatism or scientific statement which is often inconsistent with clinical truth. This point should be stressed on occasion.

SOME QUESTIONS

Your chairman* kindly listed some questions the answers to which he thought might be of interest and utility. These are as follows:

"How should the radiologist prepare a case?" Well, it seems to me that he should be eternally prepared. He is a specialist in the field. His technical work should be good and his interpretation should be skillful. His library, or that in a nearby institution, should supply refinements of information in suitable cases.

"Can you ask for additional examinations before trial?" One can ask for them, but they are often not obtainable. Furthermore, they are frequently not necessary for the problem at issue. Careful study of the available records, radiologic and otherwise, will usually permit the radiologist to testify adequately. But it is desirable that the study be deliberate, with proper viewing equipment in light-controlled rooms.

"Can you refuse to testify on films that you consider inadequate for any reason?" Well, except you are subpoenaed, I presume you can always refuse to testify on such. If you are subpoenaed, you can point out the fact that the films are technically or otherwise inadequate (with specific reasons for the opinion), and therefore the possibility of drawing valid conclusions is accordingly restricted.

"Do you attempt to show normal views or demonstrate examples of similar disease?" Depending on the degree of histrionics required in order to establish the maximum chance of justice being administered, I suppose that normal views or other projections might be brought to court and an attempt made to introduce them. It has not been customary in my limited experience.

"Do you accept magnafilms or minifilms as legitimate examinations?" Certainly. In selected cases magnified-image views may be of value; and in other

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cases minifilms, properly identified, may be shown both in standard size and by means of "blow-ups." It appears to be the consensus of scientific radiologic and orthopedic thought that magnified-image films seldom disclose bone lesions not visible in properly made orthodox films. Examination of the latter with a two-power hand lens will usually provide *all* of the information obtained by magnified-image views, with much less radiation exposure to the patient, and with less risk of fuzzy or distorted shadows which can lead to erroneous interpretations.[4,5]

"Are you allowed any opportunity to discuss the case with other consultants before the trial?" Yes.

"Are you required to use the equipment made available in court, or can you bring some of your own?" It is my understanding that you can bring some of your own if you desire; however, it is my impression that the use of the ordinary viewbox available in court (aided perhaps by a blackboard sketch) is just as likely to result in a convincing demonstration as is the use of special equipment.

"How do you keep from lingual trespass when the law requires you to speak?" I should imagine the answer to this is that you should keep your feet firmly under the chair, and your tongue retracted and moved the minimum amount required for clarity of expression.

"When can you refuse to answer with a categorical yes or no?" You can refuse to answer with a categorical "yes" or "no" when the latter would result in an untruthful or misleading answer. One can always turn to the judge and request permission to qualify one's answer in order to render a clear and truthful reply.

"What factors determine the fee?" Well, they are many. The primary factor is justice to all concerned. If you are away from your office or hospital department for four hours, and you have thereby lost consultations which amounted to perhaps a hundred dollars in fees, you are certainly entitled to that sum plus necessary traveling expenses. If the loss has been greater or less, your fee could be reasonably greater or less. On the other hand, if you are testifying on behalf of a colleague in a case of alleged malpractice, it is customary to charge no fee. We are informed that some physicians appear in court on a contingency basis, such as 10 per cent of the settlement. The ethics of this would appear to be open to question.

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